



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/828,773	04/20/2004	Badredin Fatemizadeh	112518.00005	5237

26707 7590 12/27/2005

QUARLES & BRADY LLP
RENAISSANCE ONE
TWO NORTH CENTRAL AVENUE
PHOENIX, AZ 85004-2391

EXAMINER

ABRAHAM, FETSUM

ART UNIT	PAPER NUMBER
----------	--------------

2826

DATE MAILED: 12/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/828,773

Applicant(s)

FATEMIZADEH ET AL.

Examiner

Fetsum Abraham

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-11, 13-17, 19-20-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) the rest is/are rejected.
- 7) ☒ Claim(s) 13, 15, 22, 27 and 29-31 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 7-11,14,16,17,19, are rejected under 35 U.S.C. 102(a) as being anticipated by Hatakeama et al (6,855,970).

As for claims 7,9,11 the patent discloses a JFET structure in figures 1 and 26 comprising a gate line (18) in contact with gate region formed within a trench formed in epitaxial layer (2) of first conductivity type (n-type), a first second conductivity type (P-type) region (12) deposited within the epitaxial layer directly under the gate, a second second conductivity type (P-type) region of less impurity concentration than the first second conductivity type (P-type) region formed under the first second conductivity type region (12).

As for claim 8, source region (3a) and drain region (1) are respectively formed above a first portion and under the epitaxial layer of the structure.

As for claim 10, the first region is a P+ type and the second region is a P- region semiconductor material.

As for claim 14, the second region (9) is positioned adjacent the first portion of the first region (12), the first portion in this pretext being the entire outer section of the first region.

As for claims 16,17,19 the first conductivity type of the prior art JFET device is n-type material and the first and second regions are P+ and P- type materials.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 20,23,24 are rejected under 35 U.S.C. 102(b) as being anticipated by Yilmaz et al (5,597,765).

The prior art shows a structure in the front page comprising a gate finger (20), an epitaxial region (12) of the first conductivity type and a first region of second conductivity type (14) within the epitaxial layer and partially, at least the bottom part under the gate region, the layer extending through at least half the depth of the oppositely doped epitaxial layer.

Please consider that the elements associated with gate electrode (68) also read on the claim language in that a portion of layer (14) is under the gate electrode (68) although is laterally spaced from the gate electrode and the gate finger (20) is a gate element associated with the gate (68).

As for claim 23, the structure has trench gate, the trench formed inside layer (14) in case of gate finger (20) or inside the epitaxial layer in case of gate electrode (68).

As for claim 24, the source (72) and the drain (10) are located at the claimed locations in relation to the epitaxial layer (12).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 21,25,26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yilmaz et al (5,597,765).

The patent discloses all subject matter claimed but may have limited the figures to a single device representing the specific invention. However, it would have been obvious to one skilled in the art to repeat the same structure in a common substrate because the front page drawing indicates the extension of the overall structure at least in the left side of the structure and since similar devices are commonly fabricated on a single wafer to save material, to reduce fabrication time and steps.

As for claim 25, the prior art may have a p-type semiconductor material but it would have been obvious to one skilled in the art to reverse the conductivity types of the structure without compromising the inventive concept since such practice is common in the art with the most visible effects being application voltage polarity and device mobility.

As for claim 26, the first region in the prior art is a P-type material. Although the doping level of the region is not as high as the claimed region, it would have been obvious to one skilled in the art to dope such regions very high as in the claimed structures in such application provides a device with a relatively higher voltage application than devices having less doped layer for the specific region.

Claims 28,32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatakeama et al (6,855,970).

The prior art discloses all subject matter claimed including source, drain and deeply extended into an epitaxial layer first region (109) as shown in the JFET figure 12, but may have omitted the functional language on source/drain resistance reduction effect of the penetration of said first region into the epitaxial layer. However, it would have been obvious to one skilled in the art to safely assume the effect is also established by the prior art since the first region of the prior art substantially penetrates into the epitaxial layer of the JFET and since such structures allow the gate to modulate relatively larger area of the channel in JFET as of its depletion and conductance are considered which may have effect in the source/drain resistance reduction as a result.

Claim 15,13,22,27,29,30,31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fetsum Abraham whose telephone number is: 571-272-1911. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915.

Fetsum Abraham

12/7/05

